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CARTOGRAPHIC ACTIVITIES IN ETHIOPIA
(1986-1989)

By

Ethiopian Mapping Authority

I. INTRODUCTION

1. Ethiopia being one of the developing countries, great emphasis is given to surveying and mapping activities in order to study the natural resources and to accelerate the overall socio-economic development efforts.
2. The country is potentially rich in natural resources but the development of these resources could not be carried out in full swing partly due to the inadequate terrain data base which is a prerequisite for planning and development of its resources.
3. Surveying and mapping activities undertaken by the Ethiopian mapping Authority (EMA) embrace training of manpower, acquisition of scientific equipment and carrying out different kinds of mapping suitable for agriculture, forestry, water and mineral resources, road construction and other fields of development.
4. EMA is an autonomous government organization responsible for surveying, mapping, remote sensing and geographic studies. It provides cartographic services to government and private organizations.
5. Although it has been established 36 years ago, it was not fully engaged in the preparation of topographic maps until the last 10 years, because it was mainly engaged in providing cadastral services. At present, the Government gives full support in strengthening the Authority.
6. Presently EMA executes its task by using modern geodetic survey, photogrammetric, cartographic, remote sensing, map reproduction equipment. Its staff development programme is being intensified through in-service training at EMA and abroad for higher and specialized training.
7. Following are the status of activities carried out by EMA.

II. GEODETIC SURVEYING

8. One of the important considerations taken is to provide the basic control data. The national geodetic network consisting of first, second and third order is uniformly extended over an area of 490,000 km² to the regions of relatively high potential in natural resources.
9. Extension and intensification of the national geodetic control network is being accomplished on a continuing basis at an average rate of 30 000 km² per year using classical approaches and Doppler surveys. However, some isolated areas are mapped using local control and Doppler depending on the application of the end-products. Geodetic control nets are also extended as required to regions where large-scale mapping and engineering survey data are required. The controls during this type of work are of the second and third order for isolated surveys necessary for irrigation, hydroelectric dam construction, town planning, railways and water resources ranging from 1:500 to 1:10,000 scales.

III. AERIAL PHOTOGRAPHY

10. Since 1957 Ethiopia has been covered by 1:50,000/1:40,000 scale wide angle aerial photographs for the preparation of 1:50,000 and 1:250,000 scale topographic maps. Other large-scale photographs ranging from 1:8,000 - 1:20,000 covering major towns, agricultural and hydroelectric dam sites, railway and highway construction projects are also available. From 1980-1989 photographs covering an area of 306,000 km² have been flown at 1:50,000/1:40,000 scale. The small- and large-scale photographs are used for topographic mapping of various scales and for photo interpretation.

IV. TOPOGRAPHIC MAPPING

11. All sort of maps are produced in varying topics, scales, and colours and formats to fulfil particular map requirements of the country. Ethiopia is covered with 1:250,000 scale maps. This is the largest scale map available covering the whole country with 97 map sheets. These maps were published from 1965-1972. Due to the development activities being carried out in the country, there is wide demand for this product, but most of the maps are fairly old and need revision. But because of other priorities it has not been possible to update these maps. Since 1971 EMA has been involved in the production of 1:50,000 scale national topographic map series which is found to be quite sufficient for multi-purpose use. To cover the whole country at this scale over 1,700 map sheets of fifteen by fifteen minutes quadrangle are required. The choice of priority areas for mapping depends on agricultural, geothermal, hydro-electrical, forest, mineral and water resources potentials. To date, about 29 per cent of the country mainly the central, western, north-western and south-western areas have been covered.

12. In addition, a large number of small-scale maps ranging from 1:500,000 to 1:2,000,000 scales dealing with various topics are available. Among these are 1:1,000,000 and 1:2,000,000 topographic, land use, tourist, road network maps as well as other topics.

13. The demand for large-scale mapping ranging from 1:2,000 to 1:10,000 for town planning, irrigation and hydro-electric dam sites and other engineering projects is increasing. Since 1983, maps for 50 major towns and for 30 other projects covering an area of 6,000,000 ha. have been compiled and additional work is in progress.

14. Special purpose maps such as land use, soil, geological, climatological and historical maps are also prepared jointly with other ministries.

V. THEMATIC MAPPING

15. In addition to the topographic and special purpose mapping, thematic mapping covering a wide range of topics are prepared based on geographic research for projects such as national and regional atlases. The multi-colour national atlas of Ethiopia is now completed and is in circulation. Work on a geographic gazetteer to facilitate the location and identification of feature names is in advanced stage of production.

VI. MANPOWER AND EQUIPMENT

16. The Ethiopian Mapping Authority, being the national cartographic service, is responsible for all surveying, mapping and remote sensing activities. During the reporting period EMA has over 185 employees; out of these, 49 are on contract basis.

17. The Authority has modern surveying, photogrammetric, cartographic and map reproduction equipment, orthophoto system and medium capacity electronic computers. The demand for mapping services and the available equipment and trained manpower do not correspond. The Authority, in its endeavour to fulfil its responsibilities and increase the production in some areas of activity, has introduced a shift system of work.

18. Among the major equipment that the Authority is lacking at present are GPS systems aerial cameras and aircraft. To date these activities are supplemented by acquiring services on rental basis.

VII. FUTURE ACTIVITIES

19. Future activities of the Ethiopian Mapping Authority embrace undertaking further technical operations, technology transfer and training of manpower abroad through scholarship grants from friendly countries and international organizations.

A. Map revision programme

20. The territory of Ethiopia covers over 1.2 million km² of land mass as well as the coastal water of the Red Sea along a 1,200 - km shore with numerous islands. As mentioned above under section IV, 97 map sheets of the 1:250,000 scale standard series and 1,700 maps of the 1:50,000 series are required for full national coverage. The most recent compilation date of the quarter million series was 1972 using photogrammetric methods. Evidently, this series requires map revision immediately. EMA could benefit from the experience of other bodies in the selection of efficient methods of revision.

21. The period of revision is tentatively set at 10 years. For the task, cyclic aerial photography and/or satellite imaging are required. At the moment, EMA itself does not own aircraft capable of aerial photography. It acquires such service either locally or from abroad depending on the photo scales. To remedy this situation, EMA is planning to acquire its own aircraft in the medium term. Satellite imageries could be acquired from established sources using standard procedures.

22. Different methods will be employed for the revision. One approach would be to produce orthophoto maps at convenient scale using the Authority's orthophoto system, which is recently acquired and is in the process of installation, and to transfer the detail directly onto a transparent base. Finally, this is brought to 1:250,000 using photo-mechanical magnification. The revision of 1:50,000 maps could be carried out using similar methods or using stereo-plotters to acquire the required control points.

B. Orthophoto mapping and remote sensing

23. Orthophoto map production will commence in 1989. The advantages of such maps over line maps is the rapid speed of production. In addition these maps are found to be more desirable than line maps for irrigation, forestry and town planning purposes.

24. Since there is only 29 per cent national coverage with standard series 1:50,000 maps, there is a shortage of such maps. To meet adequately the growing demand for the maps, more accelerated production of the 1:50,000 maps or acceptable substitutes are required. The present rate of production is about 40 maps annually and mapping is carried out continuously. Occasionally, mapping is carried out spasmodically at this or larger scales on demand available basis to satisfy the request of end users.

25. A remote sensing section has been established in the Authority. At present, preliminary activities are focused on acquisition of basic equipment and training of personnel both locally and abroad. Initial production stages will involve pilot projects before embarking on full-scale production. The section will also function as a national user facility centre. Present areas of interest identified to date include crop yield forecast, forest inventory, map revision, inland water pollution studies, river valley development master plans, water and soil conservation, land use and map revision using satellite imageries.

26. Another area of interest in the long run is digital mapping and establishment of data bases. As this involves new investment of capital in hardware and software, there is a plan to evaluate the hardware and software requirements for the establishment of a Geographic Information System.

C. Training programme

27. Since the higher educational institutions within the country do not produce qualified personnel in the field of surveying and mapping, the Authority is faced with a critical shortage of trained manpower. It has therefore introduced its own in-service training during production just to mitigate the situation.

28. Areas of priority at present are remote sensing and computer applications. Further training opportunities are given to competent employees to study abroad through scholarship grants obtained from friendly countries and international organizations. The output of these training programmes could be rated as satisfactory and needs to continue in the future to fulfil the ever-increasing demand for qualified personnel.